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South Carolina Energy Statistical Highlights

South Carolina Energy Office
SC Budget and Control Board



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<http://www.energy.sc.gov/index.aspx?m=1&t=6>**

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Forward

Energy is more important than ever for the functioning of modern economic and civic life. However, households, businesses, non-profit organizations, and public agencies in South Carolina continue to face obstacles in their pursuit of affordable and cost-effective sources of energy. As energy prices continue to rise and the state struggles to recover from an economic recession, policy-makers and energy consumers in all sectors require up-to-date energy data to inform their planning and decision-making in the years to come.

South Carolina Energy Statistical Highlights is the South Carolina Energy Office's (SCEO) summary of current and historical energy statistics, with a focus on new and important developments in the state's consumption of energy resources. Rather than simply reprinting publically-available energy data, this report is designed to illustrate and underscore trends in energy consumption that are directly relevant for statewide energy policy and long-range planning.

All efforts have been made to ensure that the information provided in this report is compiled from the best and most recent sources in the public domain. Please note that, because of the broad scope, these data are typically released with a significant time lag. As a result, the majority of the statistics presented in this report are current as of 2008; only the sections on Transportation, Natural Gas, and Renewable and Alternative Fuels contain more recent data. Please visit www.energy.sc.gov to find the latest updates as new data become available.

The SCEO, a part of the South Carolina Budget and Control Board, provides a broad range of services to help the state's citizens, businesses, non-profits, and public agencies to save energy and money. You can find out more about us online at www.energy.sc.gov.

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1. Overview—S.C. Energy Demand (2008)

Total end-use energy consumption in South Carolina decreased 2.2% in 2008, consistent with a multi-year trend of marginal reductions driven by increasing fuel prices and declining consumption in the industrial sector¹. (“End-use” is the energy used at the point of consumption; it does not include energy expended in the generation, transmission, or distribution of electricity.)

The 2008 decrease in energy demand occurred alongside surging inflation-adjusted energy prices in the state, which increased an average of 20.1% across energy sources, and a stagnant state economy, which experienced a 0.3% decrease in real gross domestic product (GDP) after ten straight years of growth². (Due to changes in measurement criteria, consistent state economic data are only available from 1997 to 2008.)

Heating degree days (a measure of need for building heating) increased 7.4% over 2007 levels, contributing to heightened energy demand in the winter months. However, cooling degree days (a measure of need for building cooling) fell by 15.5% in 2008, reducing summertime demand for electric-powered air conditioning units³.

¹ U.S. Energy Information Administration (EIA):

<http://www.eia.gov/emeu/states/state.html>

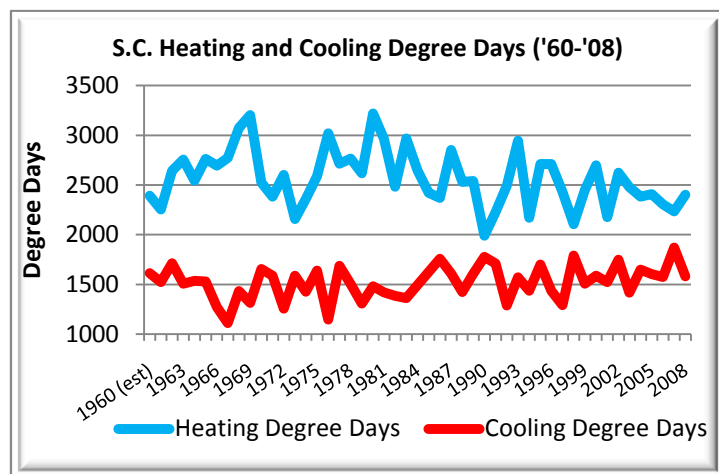
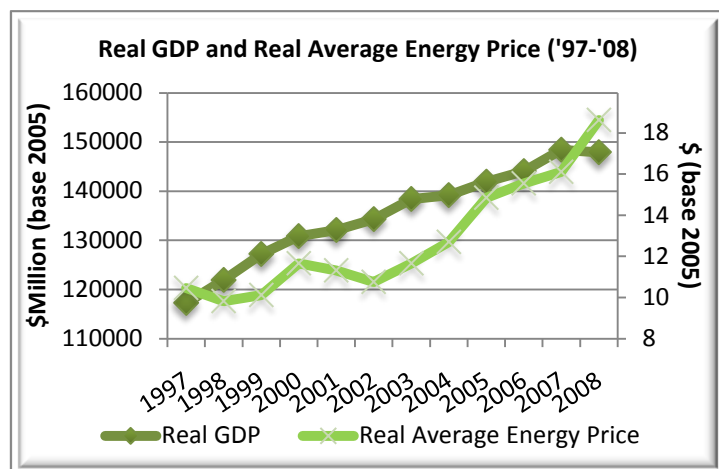
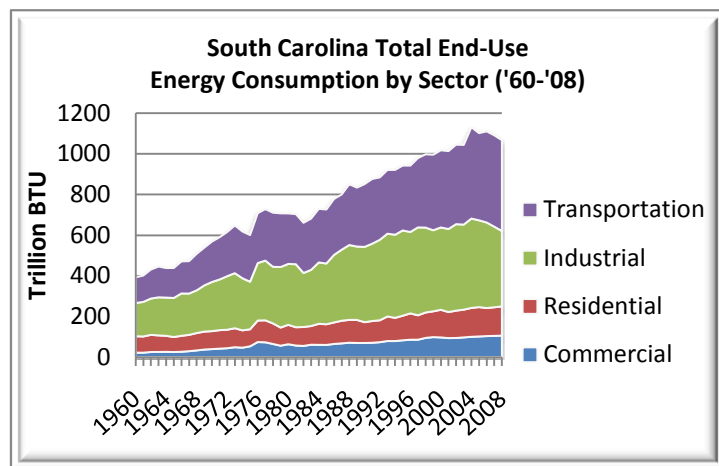
² EIA: <http://www.eia.gov/emeu/states/state.html>

U.S. Bureau of Economic Analysis (BEA):

<http://www.bea.gov/regional/gsp/>

³ S.C. Department of Natural Resources (SCDNR):

<http://www.dnr.sc.gov/>

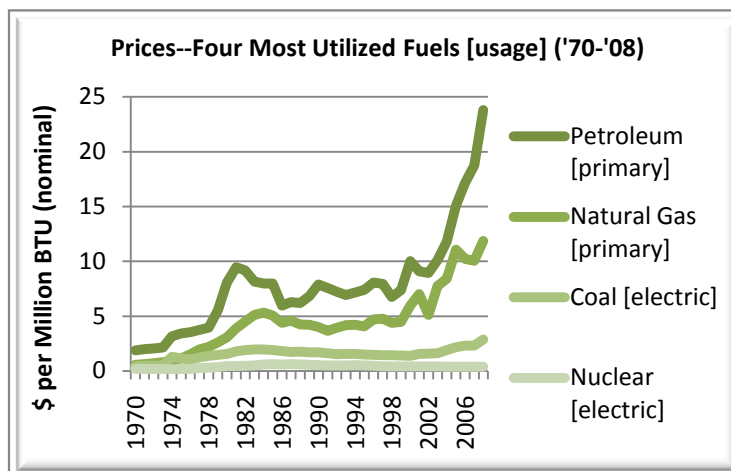
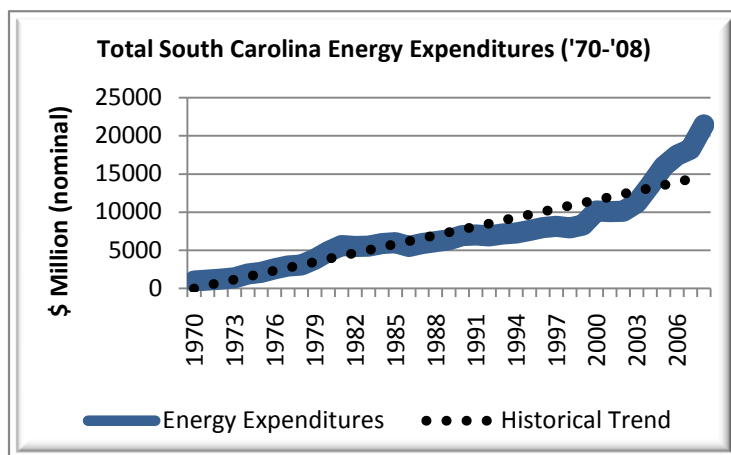


2. Energy Expenditures and Prices (2008)

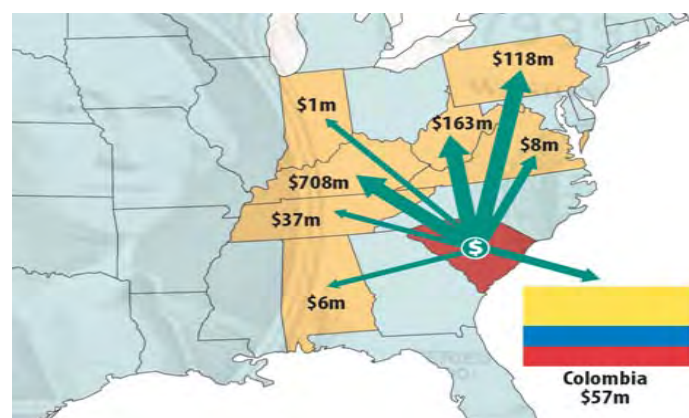
Total South Carolina energy expenditures increased 17.5% in 2008, setting a new state record of \$21.4 billion and following four straight years of historically unprecedented energy spending growth⁴. A dotted line showing predicted values based on the historical trend is provided at right for reference. (Data for energy expenditures and prices are only available beginning in 1970.)

This spending increase was the result of similarly record-setting energy prices, and was mitigated only slightly by declining energy usage. Fuel costs spiked in all sectors and across all fuel types, with the most significant increases occurring in petroleum products (26.9% increase) for primary consumption, coal (22.7% increase) for electric generation, and natural gas (17.9% increase) for primary consumption⁵. (“Primary” refers to fuels used at the point of consumption—such as heating oil or motor gasoline—as opposed to fuels burned in the generation of electricity for distribution by utilities.)

South Carolina has no indigenous sources of petroleum or coal; therefore, these spending increases contributed to ballooning trade deficits with other states and foreign entities that supply these fuels.⁶



Money Leaving South Carolina for Coal Imports ('08)



⁴ EIA: <http://www.eia.gov/emeu/states/state.html>

⁵ EIA: <http://www.eia.gov/emeu/states/state.html>

⁶ Coal graphic courtesy of Union of Concerned Scientists: <http://www.ucsusa.org/> Data source—EIA: http://www.eia.doe.gov/cneaf/electricity/page/eia906_920.html

3. Transportation Sector (2008, 2009)

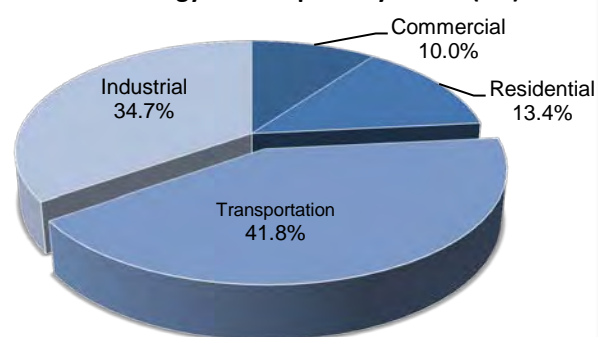
South Carolina's transportation sector expended the largest share of end-use energy in 2008, accounting for 41.8% of the state's energy usage at the point of consumption⁷. "Transportation" includes energy usage in all air and ground-based vehicles fueling in the state.

Total transportation energy use decreased slightly in 2008, dipping 0.5% as a result of declining consumption of diesel fuels and despite increased consumption of motor gasoline.

Automobiles are responsible for the majority of energy consumption in South Carolina's transportation sector. Total motor gasoline consumption increased 1.6% in 2008 and increased 5.3% in 2009. Some of this additional consumption was of fuel ethanol, which increased four-fold in 2008 and another 30% in 2009 (largely though gasoline-ethanol mixes, such as E10.) However, ethanol contributed only 5.7% of the total motor gasoline mix in 2009⁸. (South Carolina does not mandate blended gasoline.)

It should be noted that state-level data on transportation energy consumption includes purchases made by out-of-state consumers—for example, cars and trucks traveling on interstate highways. Given that South Carolina has the lowest tax-inclusive gas prices on the southeastern portion of the I-95 corridor, it is likely that these data are inflated by trips originating from elsewhere and overstate the transportation energy consumed by South Carolina residents and businesses⁹.

S.C. End-Use Energy Consumption by Sector ('08)

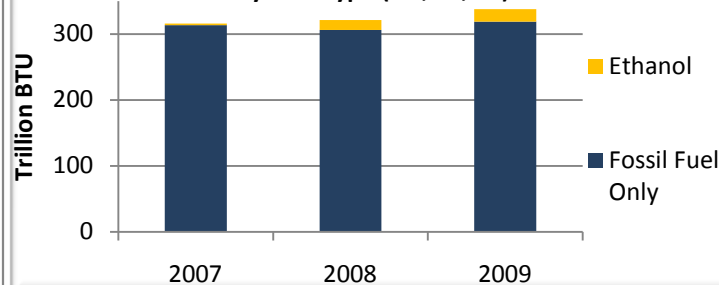


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South Carolina Transportation Energy Consumption by Fuel Type ('07, '08)



South Carolina Motor Gasoline Consumption by Fuel Type ('07, '08, '09)



⁷ EIA: <http://www.eia.gov/emeu/states/state.html>

⁸ EIA: <http://www.eia.gov/emeu/states/state.html>

⁹ AAA: <http://fuelgaugereport.opisnet.com/sbsavg.html>

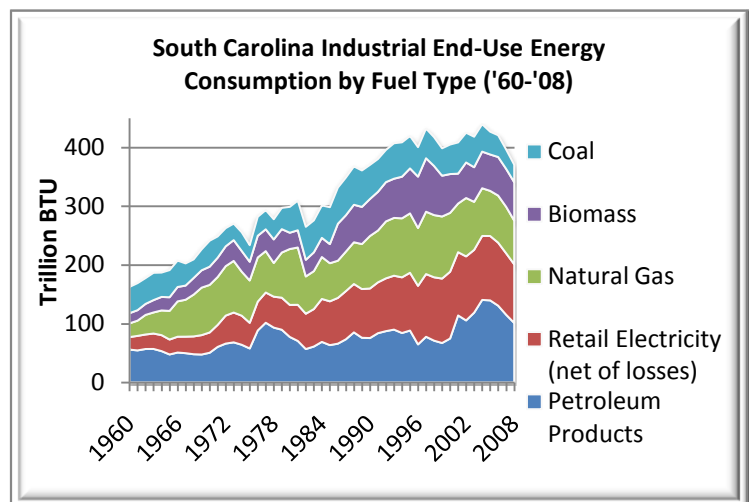
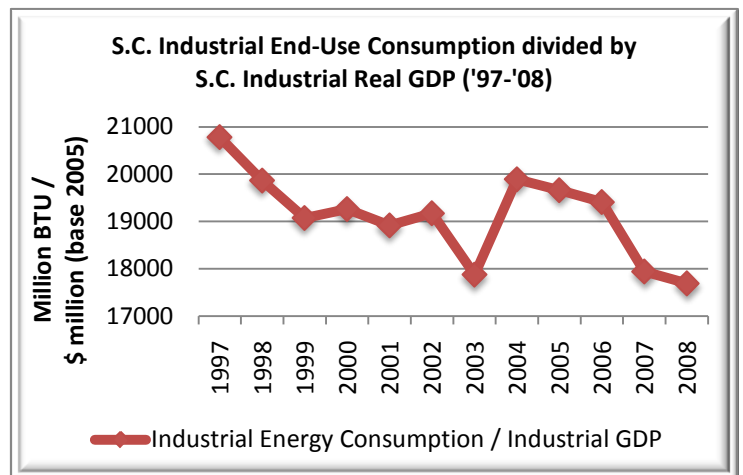
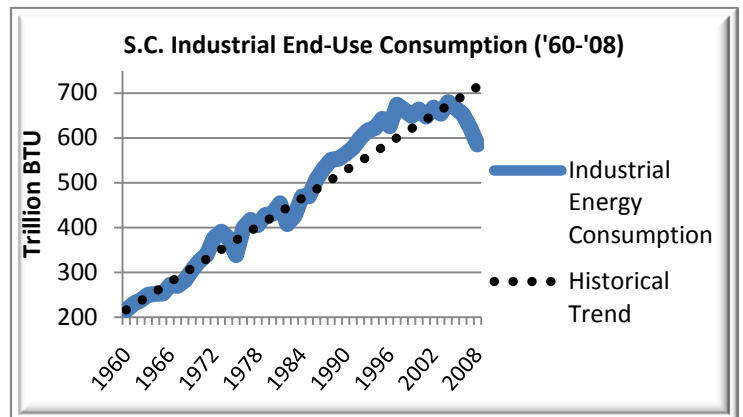
¹⁰ Due to rounding, the percentages in this pie chart total slightly less than 100%.

4. Industrial Sector (2008)

The industrial sector was responsible for the second-largest share of end-use energy consumption in 2008. However, total industrial energy usage fell 6.46%, continuing a five-year trend of historically anomalous declines in industrial energy consumption¹¹.

The 2008 energy consumption decrease can be partially attributed to declining industrial activity during the economic recession. However, the fact that industrial energy consumption per dollar of industrial output has also decreased—through periods of both expansion and contraction—suggests that other factors such as increased energy efficiency may be responsible¹².

Industrial reliance on petroleum—the chief end-use source of energy in the sector—has dropped considerably over the last four years, although exploitation of other sources such as electricity purchases, natural gas, and coal has fallen slightly as well¹³.



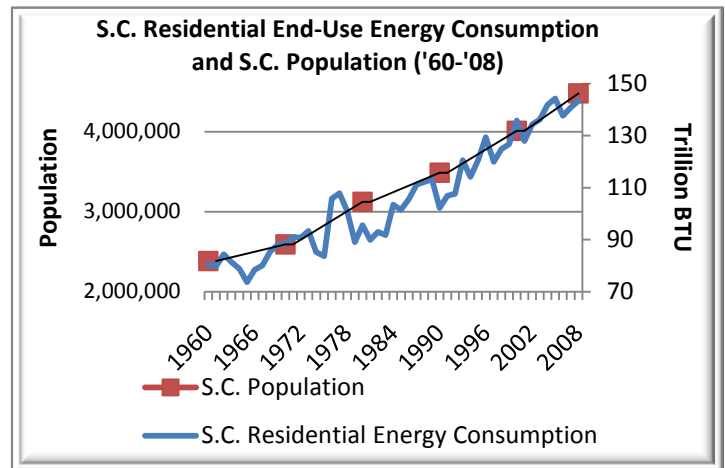
¹¹ EIA: <http://www.eia.gov/emeu/states/state.html>

¹² EIA: <http://www.eia.gov/emeu/states/state.html>
BEA: <http://www.bea.gov/regional/gsp/>

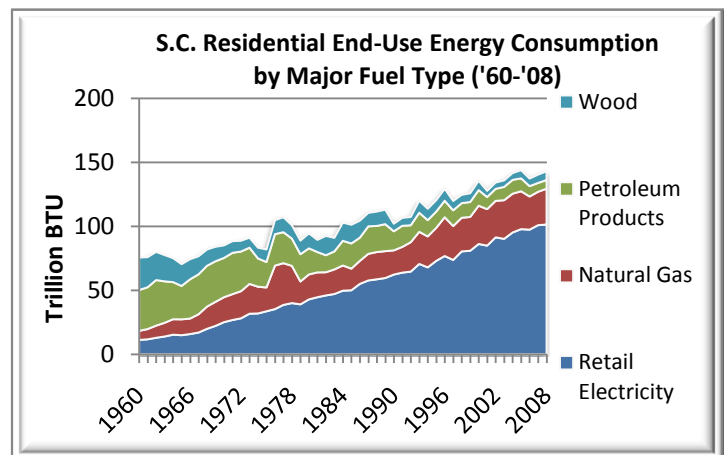
¹³ EIA: <http://www.eia.gov/emeu/states/state.html>

5. Residential Sector (2008)

End-use energy consumption in the residential sector increased 1.0% in 2008. Residential energy consumption in South Carolina has historically correlated with population growth, remaining roughly constant on a per-capita basis between 1960 (33.8 MMBTU per-capita) and 2008 (32.03 MMBTU per-capita)¹⁴.



Residential natural gas consumption grew by 7.2% in 2008, continuing a historical trend of replacing petroleum with gas for home heating. Household use of wood and wood-derived fuels also expanded slightly, increasing 4.6% over 2007 levels. However, electricity continues to predominate as the preferred energy source for the heating, cooling, and powering of South Carolina homes¹⁵.



South Carolina had the 11th lowest median household income in 2008. Low-income households are typically less able to invest in cost-effective methods of climate control and home weatherization¹⁶. A South Carolina household earning the median income spent on average 4.8% of their wages on home energy expenditures in 2008, higher than the United States average of 4.4%¹⁷.



¹⁴ EIA: <http://www.eia.gov/emeu/states/state.html>

US Census: <http://www.census.gov/popest/states/>

¹⁵ EIA: <http://www.eia.gov/emeu/states/state.html>

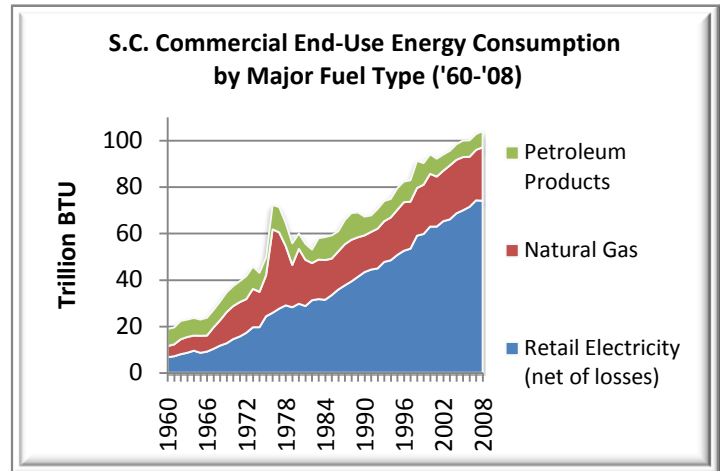
¹⁶ For relevant data on fuel use and home quality by income, see EIA: <http://www.eia.doe.gov/emeu/recs/>

¹⁷ EIA: <http://www.eia.gov/emeu/states/state.html>

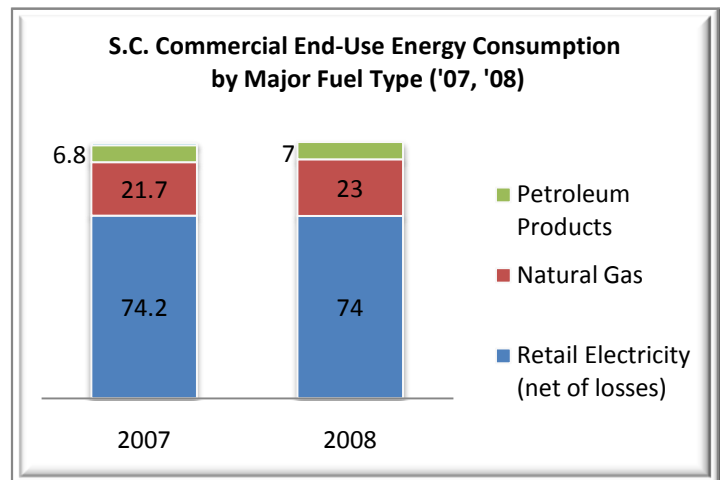
American Community Survey:
<http://www.census.gov/prod/2009pubs/acsbr08-2.pdf>

6. Commercial Sector (2008)

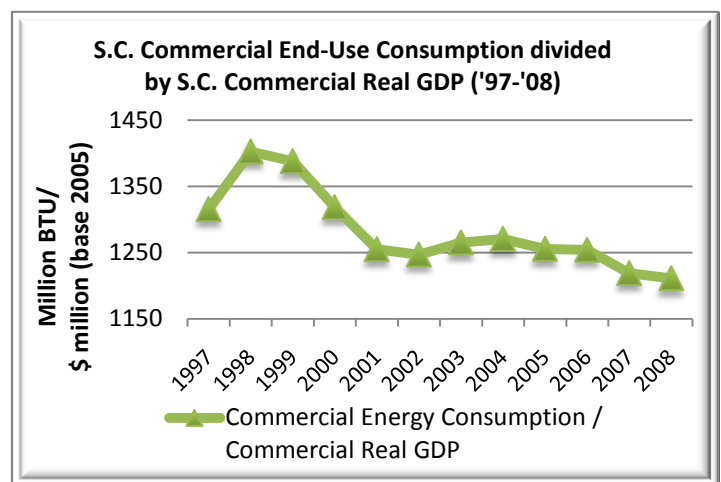
Commercial end-use energy consumption increased 0.3% in 2008. The commercial sector has grown increasingly reliant on electricity purchases, from which it derived 69.5% of total energy needs at the point of consumption in 2008¹⁸. The commercial demand for natural gas and fuel oil spiked between 1976 and 1978 during a period of unusually cold winters¹⁹.



Commercial electricity purchases dipped slightly in 2008, while consumption of natural gas increased 6.0% and petroleum consumption increased 2.9%²⁰.



Commercial end-use energy consumption has been relatively consistent with commercial output in recent years, although energy use per real dollar of commercial GDP has decreased slightly since 1997²¹.



¹⁸ EIA: <http://www.eia.gov/emeu/states/state.html>

¹⁹ SCDNR: <http://www.dnr.sc.gov/>

²⁰ EIA: <http://www.eia.gov/emeu/states/state.html>

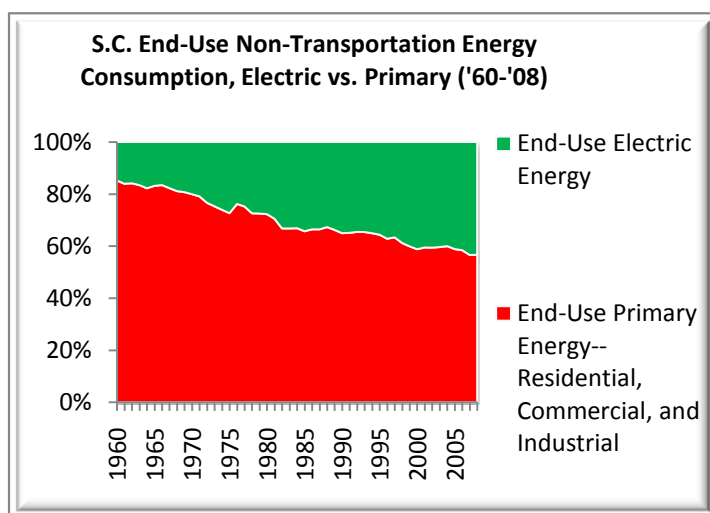
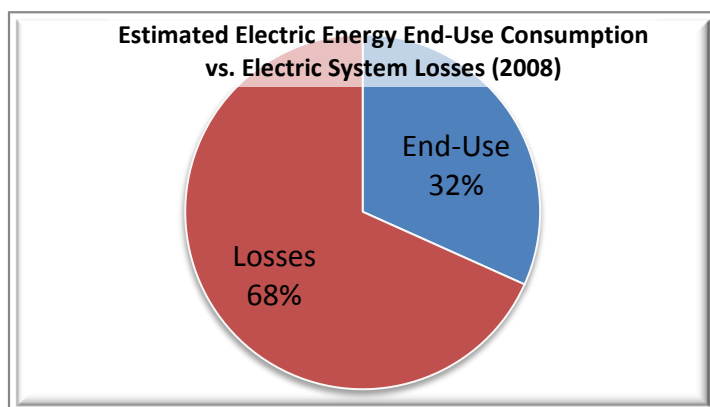
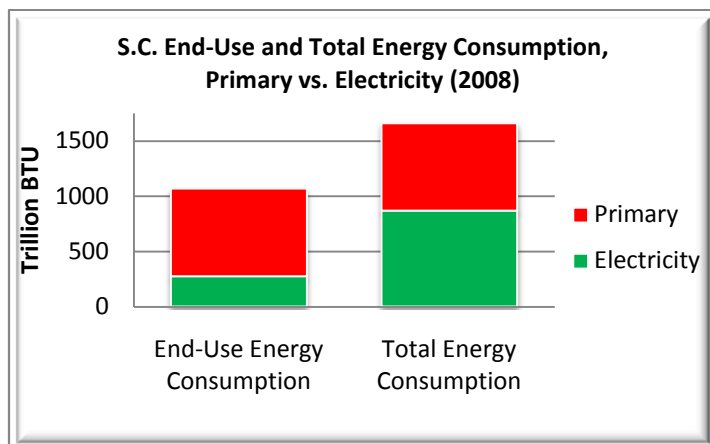
²¹ EIA: <http://www.eia.gov/emeu/states/state.html>
BEA: <http://www.bea.gov/regional/gsp/>

7. Electricity (2008)

A quarter of South Carolina's 2008 end-use energy consumption occurred in the form of retail electricity purchases, while the majority of end-use energy was consumed by users as primary fuel (such as motor gasoline). However, electricity was responsible for the majority of *total* energy consumption—including losses from generation, transmission, and distribution—amounting to 52.3% of all energy consumed within the state in 2008²².

The disparity between end-use and total energy consumption is a result of the substantial energy losses that occur in the electrical system. The U.S. Energy Information Administration estimates that over two-thirds of energy that enters the electrical system in the form of fuel is lost in the process of electricity generation, transmission over long distances, and distribution within service areas.²³

There has been a structural shift in South Carolina energy usage, with non-transportation energy consumers becoming increasingly reliant on electricity. While retail electricity purchases fulfilled only 14.8% of residential, commercial, and industrial energy demand in 1960, by 2008 these sectors purchased electricity to meet 43.3% of their energy needs²⁴.



²² EIA: <http://www.eia.gov/emeu/states/state.html>

²³ EIA: <http://www.eia.gov/emeu/states/state.html>

²⁴ EIA: <http://www.eia.gov/emeu/states/state.html>

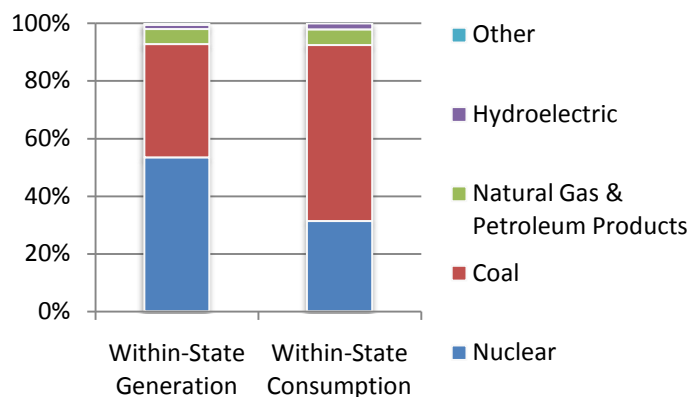
7. Electricity (2008) – continued

The largest single source of electricity generation in South Carolina is nuclear power, which accounted for 52.9% of generation within the state in 2008. Coal-fired plants contributed 40.6% of the state's local electric generation portfolio, while natural gas, biomass, and conventional hydroelectric power each contributed marginally (4.7%, 1.1%, and 0.7%, respectively.) However, South Carolina is a net exporter of electricity, selling 18 mWh of total energy outside the state for every 100 mWh consumed within-state. In addition, many of the state's electric utilities operate generating facilities in adjoining North Carolina. Taking these factors into consideration, nearly two-thirds of electricity generated for consumption by South Carolina customers is fueled by coal.²⁵ (2007 data are illustrated at right for comparison.)

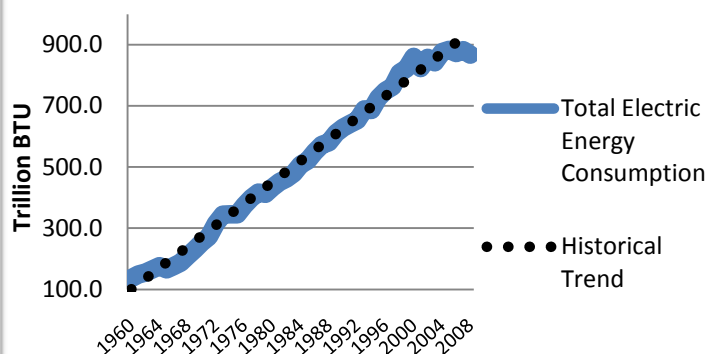
Total South Carolina electricity consumption fell 2.1% in 2008. Electricity consumption has plateaued in the past few years after almost forty years of steady increases²⁶.

This leveling in electricity demand can be partially attributed to retail electric prices, which have increased in inflation-adjusted terms after a long period of real declines²⁷.

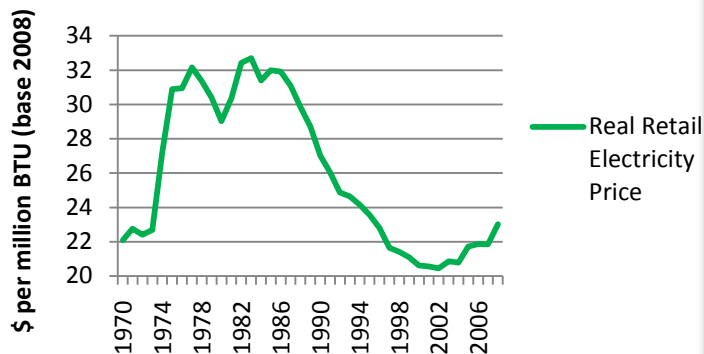
Electric Generation and Electric Consumption Within S.C., Proportion by Fuel Type (2007)



S.C. Total Electric Energy Consumption ('60-'08)



S.C. Real Retail Electricity Price ('70-'08)



²⁵ EIA: <http://www.eia.gov/emeu/states/state.html>
SC Office of Regulatory Staff (2007 is the most recent data year available): <http://www.regulatorystaff.sc.gov/>

²⁶ EIA: <http://www.eia.gov/emeu/states/state.html>

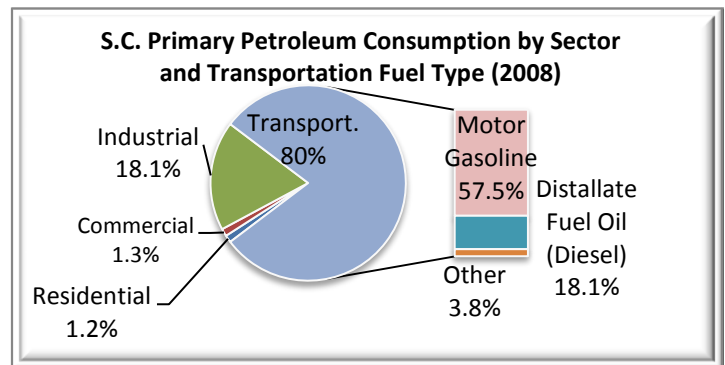
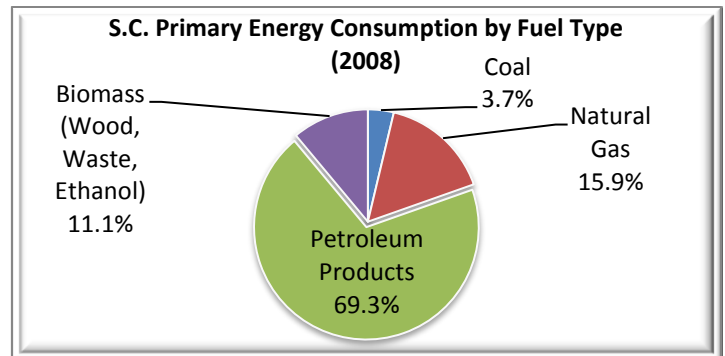
²⁷ EIA: <http://www.eia.gov/emeu/states/state.html>

8. Petroleum (2008)

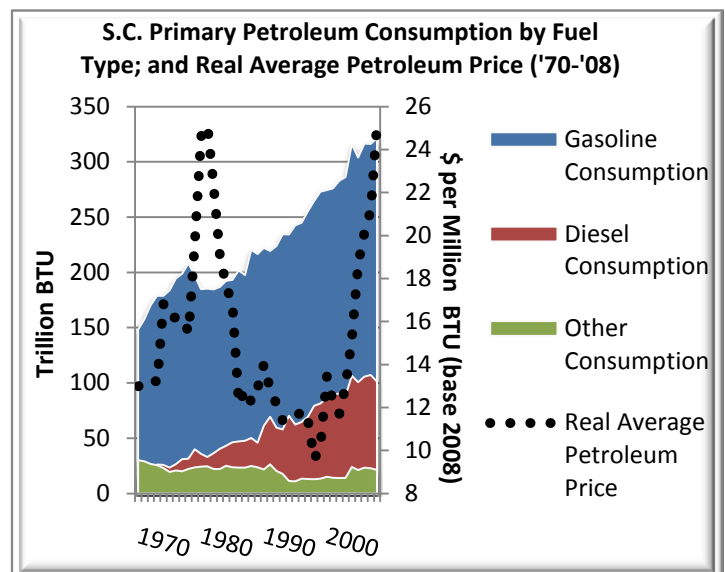
Petroleum remained the largest source of primary energy in 2008, comprising 69.3% of non-electric energy consumption in the state²⁸.

Nearly four-fifths of primary petroleum consumption occurred in the form of diesel and motor fuel use in land transportation, and most of the remainder (18.1%) was used for industrial purposes. South Carolina is minimally reliant on petroleum products for the heating of home and office buildings²⁹.

Statewide primary consumption of petroleum fell by 5.0% in 2008, occurring alongside a 19.4% spike in real petroleum prices (including a 14.6% increase in the real price of motor gasoline and a 31.7% increase in the real price of diesel fuel) on the heels of nearly a decade of continuous price increases.³⁰ Shifts in consumption of petroleum have historically lagged price changes by a few years, consistent with academic findings demonstrating that demand for transportation fuel is “sticky” and takes longer to respond to price changes than typical goods³¹.



* 32



²⁸ EIA: <http://www.eia.gov/emeu/states/state.html>

²⁹ EIA: <http://www.eia.gov/emeu/states/state.html>

³⁰ EIA: <http://www.eia.gov/emeu/states/state.html>

³¹ See Dahl, C. and Sterner, T. “Analysing gasoline demand elasticities: a survey”. Energy Economics (July 1991)

³² Due to rounding, the percentages in this pie chart total slightly more than 100%.

9. Nuclear, Coal, and Natural Gas (2008, 2009)

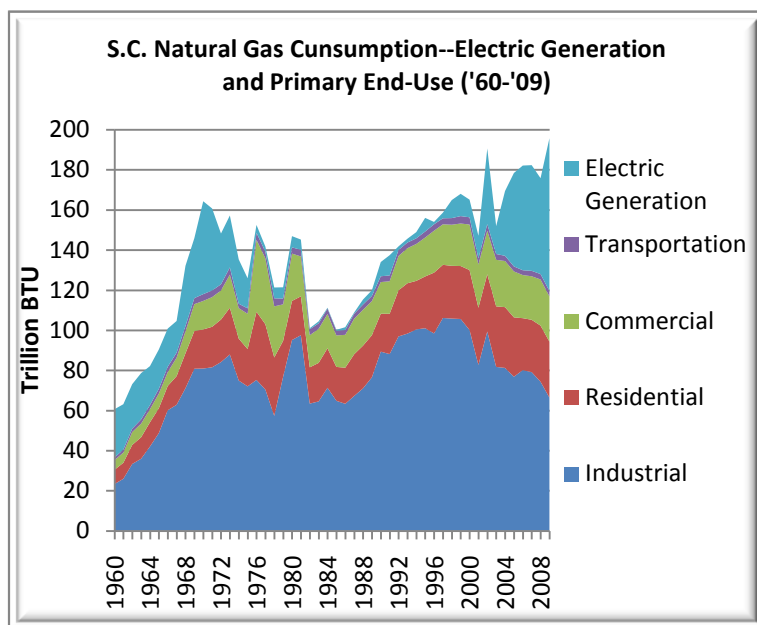
Nuclear power is a vital source of energy in South Carolina, fueling more than one-half of in-state electric generation (including sales to out-of-state customers) and nearly one-third of generation for consumption within the state. Despite its continued position as the most cost-effective source of energy, the price-per-BTU of nuclear power increased 5.3% in 2008³³.



Coal contributes substantially to South Carolina's fuel mix, supplying the majority of electricity consumed within the state. It also powered 3.7% of the state's primary energy in 2008, mostly in the industrial sector³⁴.



Natural gas met 10.6% of South Carolina's total energy needs in 2008, largely through primary consumption for building heating and industrial production but increasingly for electric power generation as well. After dipping 3.5% in 2008, statewide natural gas consumption increased 11.3% in 2009 as a result of increased usage for electricity generation.³⁵ The demand for, and cost of, natural gas has historically been very volatile, shifting in response to both supply-side factors, such as refinery disruptions and changing availability of fuels for which natural gas is a substitute, and demand-side factors, such as fluctuations in temperature and peak demand for electric power.³⁶



³³ EIA: <http://www.eia.gov/emeu/states/state.html>

³⁴ EIA: <http://www.eia.gov/emeu/states/state.html>

³⁵ EIA: <http://www.eia.gov/emeu/states/state.html>

³⁶ See EIA, "An Analysis of Price Volatility in Natural Gas Markets."

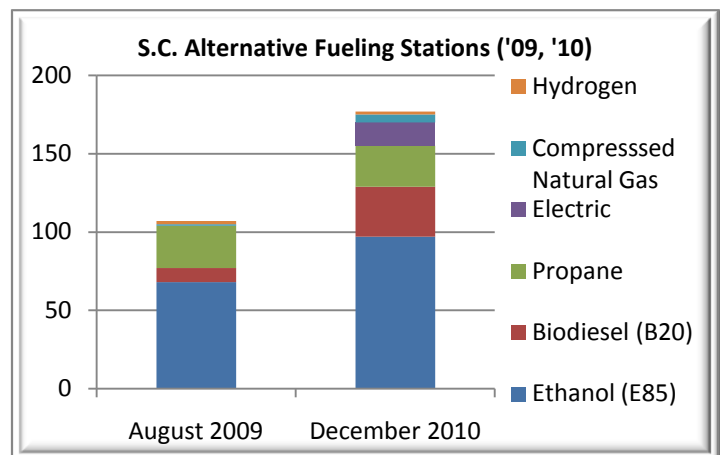
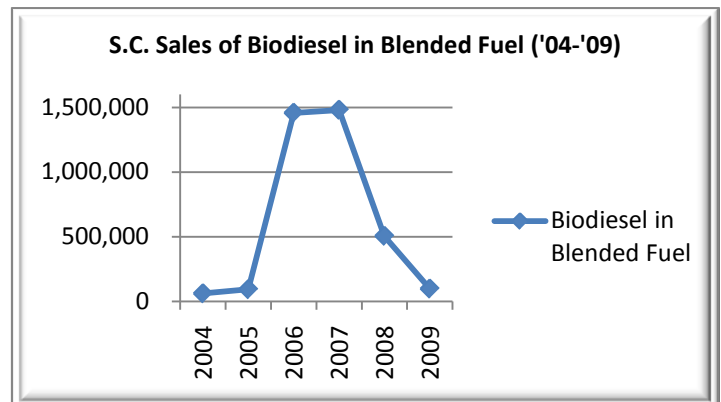
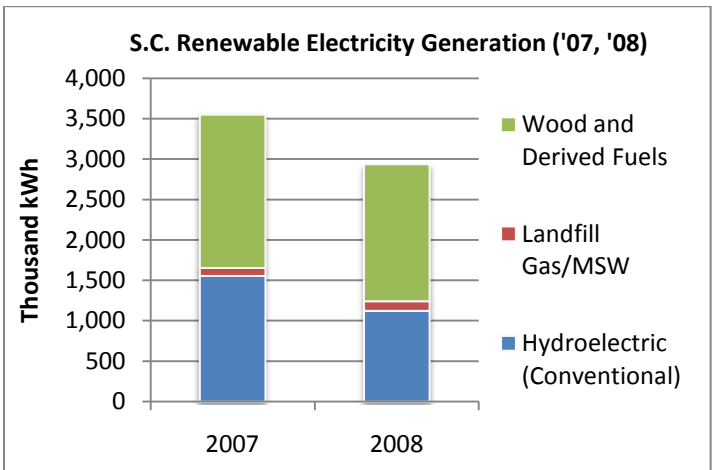
http://www.eia.doe.gov/pub/oil_gas/natural_gas/feature_articles/2007/ngprivolatility/ngprivolatility.pdf

10. Renewable and Alternative Fuels (2008, 2009, 2010)

Renewable electricity generation fell 17.3% in the state in 2008, including a 27.8% decrease in conventional hydroelectric production and a 10.5% decrease in electricity generated from wood and wood-derived fuels. In turn, the percentage of total electricity generated from renewable sources dropped from 3.4% in 2007 to 2.9% in 2008 (or 1.9% to 1.8%, respectively, when excluding hydroelectric power.) The reduction in hydroelectric power generation coincided with a period of severe drought. Electricity generation from landfill gas and municipal solid waste (MSW) increased by 19.0%, but continued to remain a small fraction of total generation. South Carolina does not currently have state mandates for renewable electricity generation³⁷.

As mentioned in Section 3 (Transportation Sector), consumption of ethanol for transportation increased over 400% in 2008 and 30% in 2009. However, the sale of biodiesel in blended transportation fuels has continued to plunge after reaching a peak in 2006 and 2007³⁸. This is partly a result of the expiration of federal biodiesel tax incentives in 2009.

South Carolina has expanded its alternative fueling infrastructure significantly in the past year and half, increasing the number of alternative fueling stations by 65.4%. Notable additions include 29 new ethanol (E85) stations, 23 new biodiesel (B20) stations, and 15 new stations for recharging electric vehicles³⁹.



³⁷ EIA:
http://www.eia.gov/cneaf/solar.renewables/page/rea_data/rea_sum.html

³⁸ South Carolina Energy Office: internal data

³⁹ South Carolina Energy Office: internal data